PREFACE

In 1986, we published the first edition of the *Handbook of Public Water Systems* under the Culp Wesner Culp corporate flag. HDR has since acquired Culp Wesner Culp. Now, 14 years later, we present the second edition. What has changed if...*there is no new thing under the sun?* Much has changed since that 1986 edition!

In 1986, *Giardia* was a worry; *Cryptosporidium* had yet to be recognized. High-pressure membranes (reverse osmosis) were used for demineralization, but low-pressure membranes were just coming on the scene and were too expensive for general application. In the intervening decade, advancements with both high- and low-pressure membranes have led to widespread application. Tube and lamella plate sedimentation and adsorption clarifiers were common in 1986, but the ballasted sedimentation concept was years away. Filtration design was more concerned with "in-depth" filtration, using relatively shallow filter depths (<36 inches) and filter rates of less than 5 gpm/sf, whereas many contemporary designs use 10- to 15-feet-deep filter beds and filtration rates of 10 gpm/sf or more.

Change has been driven by two factors: (1) a more competitive environment for water utilities, and (2) the need for better-quality water. Strong global economic forces are challenging every aspect of public service, including publicly owned and operated water utilities. Competition from private water companies is stimulating more efficient operation and management and improved technologies.

The desire for higher-quality water stems from the recognition of risk—and the need to minimize this risk—of adverse health effects from drinking water. The 1993 *Cryptosporidium* outbreak in Milwaukee caused near-panic in the public and the water industry. Pollutants such as radon and arsenic are identified as health risk problems but are expensive to remove using conventional technology.

Changes in water quality in distribution systems are of concern. Keeping water noncorrosive to distribution components and free of biological growths has become a more frequent challenge.

In response to drinking water health risk concerns, regulations are made more stringent. For example, the required finished water turbidity was 5 NTU in 1962. In 1982, the required turbidity was 1 NTU. The current (January 2000) standard is 0.5 NTU, 95 percent of the time. And many utilities have goals of 0.1 NTU. The future will require lower turbidities, restrictions on numbers of particles, and improved technologies. Even with improved technologies to treat water, greater emphasis will be placed on source water protection. Land use management, restrictions on contaminant sources, and improved nonpoint source runoff controls will likely be subjects of more and more regulations.

We can take pride in the safety of our drinking water; however, the future will require continually improved effort and technology in this area. Our industry has demonstrated the ability to respond to these challenges. In fact, change and improvements make this an exciting and memorable era in the drinking water industry.

The authors of this book are fortunate to have been involved in the development of several new and improved water treatment processes. They also have had the opportunity to incorporate these new methods into water treatment plant designs and to observe the results for full-scale plant operations. These experiences are heavily drawn upon in this book. The work of many other investigators using other new methods is also cited, in order to present the most accurate possible picture of currently available treatment methods.

This book is the result of the efforts of many individual members of the consulting engineering firm of HDR Engineering. Gordon Culp, a major contributor to the first edition, now with the firm of Smith Culp, also contributed. A list of the contributors to this handbook appears on page xiii. Their work is acknowledged with appreciation.

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